

CONCERNING *Bembidion ustulatum* L. IN
NORTH AMERICA (CARABIDAE)¹

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The question of whether *Bembidion ustulatum* L. occurs in North America is not a new one.

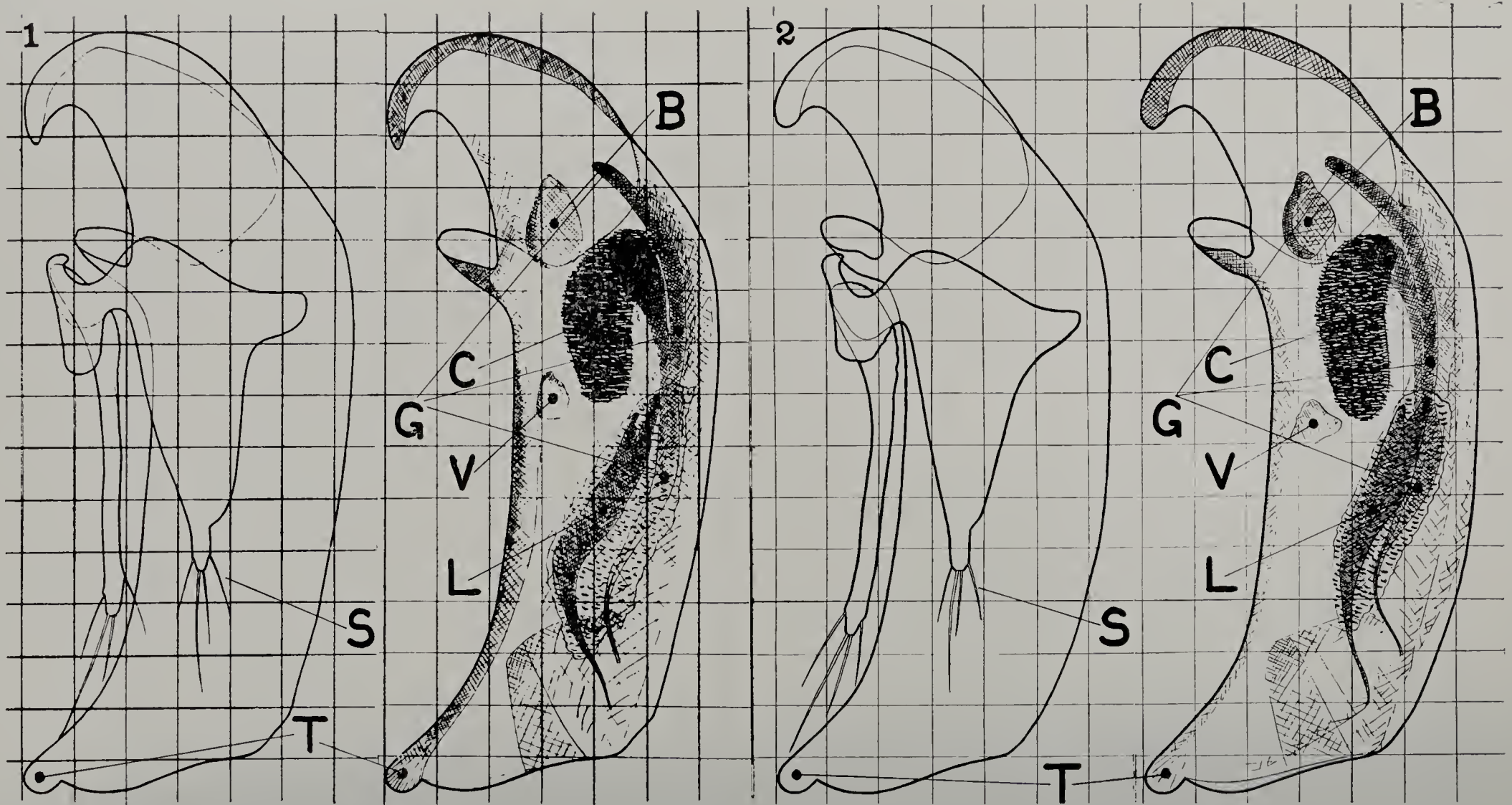
In 1823 Thomas Say described *Bembidion tetracolum*. LeConte (1848) identified it with *B. rupestre* Illig. (nec L.), which is a synonym of *B. ustulatum* L. Dejean (1831) also considered that North American specimens of *B. rupestre* (Dej., nec L.) were the same as European ones. On the other hand Schaum (1857) distinguished *B. tetracolum* Say from *B. littorale* Oliv. (sensu 1795, nec Oliv. sensu 1791), which is another synonym of *B. ustulatum* L. He said that *tetracolum* has longer elytra, wider yellow areas, less coarse inner striae of elytra, which are hardly coarser than the outer striae, and impressions on the base of the prothorax not reaching the sides. R. Hayward (1897) mentions *B. ustulatum* L. and treats *tetracolum* Say as a synonym of it. Blatchley (1910) does the same. Casey (1918) in his monograph of *Bembidion* recognizes three independent forms: *tetracolum* Say, *rupicola* Kby. (previously considered a synonym of *ustulatum* L. or *tetracolum* Say), and a new subspecies *nactum* Csy. Casey recommends the adoption of Say's name as follows: "The fact that besides *tetracolum* we have a number of closely related though distinct taxonomic modifications, shows that the *tetracolum* type has been very long established in America, and the probabilities therefore are that no one of our related forms is exactly the same as *ustulatum*. Comparisons of American with European species have been made too hastily in many instances, of which I believe the present to be one, . . ." Casey's use of the name *tetracolum* Say is apparently based not on comparison with Swedish topotypes of *ustulatum* L., but only on the consideration quoted.

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In order to decide whether *B. ustulatum* L. does occur in North America I have carefully compared a number of American "ustulatum," "tetracolum," and "rupicola" with *B. ustulatum* L. from Sweden and other parts of Europe. I have used the following actual, numbered specimens.² (1) N. York, coll. Castelnau / Mus. Civico Genova / nov. *rupicola* Kirby. A. bor. / ? Original von Kirby, *rupicola* (in Netolitzky's hand-writing); 1 ♀, in collection of the late Prof. Dr. Netolitzky in Mus. Nat. Hist. Vienna. (2) N. Y. / New York / dedit G. W. Bock, St. Louis, N. America; 1 ♂, not determined, in Netolitzky Coll. (3) Harrisburg, IV. 3. 13, Pa., Champlain / *ustulatum*, Champlain det.; 1 ♀, in Netolitzky Coll. (4) Lemoyne, V. 1. 10., Pa. / Coll. by Kirk & Champlain / *ustulatum*, Champlain det. / *tetracolum* Say sensu Chaudoir in coll. Andrewes (in Netolitzky's hand); 1 ♀, in Netolitzky Coll. (5) Harrisburg, XI. 10. 09, Pa. / Coll. by Kirk and Champlain / *ustulatum* Champlain det.; 1 ♂, Netolitzky Coll. (6) Sodus Point, Wayne Co., N. Y., 3 March 1919, H. Notman; 1 ♀, not determined, in Netolitzky Coll. (7) Long Island, N. York, 1. V. 1948, leg. F. A. Kinsel; 1 ♂, in my collection. (8-11) Lowell, Mass. / ex Mus. Comp. Zoology; 4 ♂ ♂, in my collection. (12) Sk. Vitemölla, Mölleån, (leg.) Bo Tjeder, 21. 7. 47. / Schweden, Skåne / ex coll. Lindroth; 1 ♂, in my collection. (13) Boh. Ljung, Lyckorna, (leg.) Bo Tjeder, 28. 6. 45, / Schweden, Bohuslän / ex coll. Lindroth; 1 ♀ in my collection. I have had at my disposal also a couple of hundred other specimens from Europe, including England and west and central Europe.

The species *B. ustulatum* L. has two outstanding characteristics: First, the form of the male copulatory organs, second, in most individuals, slightly reduced wings of a length equal to or about 1/8 longer than the elytra (the wings of forms *pseudo-ustulatum* Müll. and *pseudouralense* Fass. and of subspecies *pfefferi* Mař. are fully developed).

²I quote the labels exactly. A stroke (/) means another label. The notes in parentheses are mine.



Copulatory organs of *Bembidion ustulatum* L., magnified 58 times. Fig. 1: Topotype from Sweden. Fig. 2: From Long Island, New York.

The copulatory organs of a topotype (No. 12, above) of *B. ustulatum* L. from Sweden are shown in Fig. 1. On the left is the external structure, with the parameres. On the right is the inner structure of the penis as seen by transmitted light when mounted in carnation oil or concentrated acetic acid. Before mounting, the parameres were removed and the penis macerated for 24 hours in a 10% solution of KOH. An American specimen (No. 7, above) is shown in the same way in Fig. 2.

If the two figures are compared, it will be seen that they are strikingly similar. They do not differ in any important character. The size and shape of the external sac and of its tip (T) are the same. The apical part of the penis of the American specimen is somewhat wider, but this is due to its relative immaturity. The Swedish specimen has the two upper setae of the parameres set farther from the apex of the parameres, but in this respect it is an extreme variant. The position of the setae (S) of the American specimen is exactly as in most European ones. The two figures agree also in inner structure. The corpus squamosum (C) is of the same shape and size; and the shape, position, and length of the main (G) and lateral (L) sclerites are the same. The position of the corpusculum adsquamosum basale (B) and ventrale (V) is the same, although the shape is somewhat different. The shape of these structures, especially of the corpusculum ventrale, is not always constant within a species. The copulatory organs of all the other American males listed above are the same as in European specimens too.

The wings of the American specimens are slightly reduced, equal to or about $\frac{1}{8}$ longer than the elytra, as in typical European examples, except that the specimen from Sodus Point (No. 6, above) has fully developed wings, as in form *pseudoustulatum* Müll. of Europe.

The superficial characters of the specimens examined show only small differences which are certainly within the limits of variability of the species. The striae and punctures of the elytra are somewhat coarser in some specimens (Nos. 2, 7, 8) and finer

in others (5, 6) than in the Swedish examples. The prothorax of the original specimen of *B. rupicola* Kirby (No. 1) is more cordiform, with hind angles smaller than usual. No. 8 is nearly the same, but has an even wider prothorax with hind angles more obtuse. The antennae of No. 9 are a little paler from the 4th segment, nearly as in the Spanish subspecies *brachypteron* Fass. Specimens Nos. 10 and 11 also have antennae and palpi somewhat paler than usual in *B. ustulatum*. No. 5 and 6, especially the latter, are somewhat narrower and their antennae are somewhat more slender than usual, and the antennae of No. 6 are also longer than usual. The last variation is not found among European specimens, but is obviously an individual rather than a geographical character. It may mean that the species is not so fixed morphologically in North America as in Europe.

I have tried to determine my specimens by Casey's key, but they hardly fit any of his descriptions of "*tetracolum*," "*rupicola*," or subspecies "*nactum*." For example, the original specimen of *rupicola* Kirby (No. 1, above) agrees with Casey's description of *rupicola* in coarseness of striae and punctures of elytra and perhaps in width of elytra; but the ratio of base to apex of prothorax and perhaps also the roundness of the sides of the elytra agree with "*tetracolum*"; and the shape of the hind angles of the prothorax is more like "*nactum*." Specimen No. 3 is nearest to "*tetracolum*" except that it is the widest of all specimens examined, in which character it corresponds to "*nactum*." Nos. 2 and 6 are nearest to "*rupicola*," except that they are strikingly narrow as in "*tetracolum*." My specimen from Long Island is nearest to "*nactum*."

My final conclusions are these:

- (1) *Bembidion ustulatum* L. certainly occurs in North America.
- (2) *B. rupicola* Kirby is identical with *B. ustulatum* L.
- (3) *B. tetracolum* Say is probably identical with *ustulatum* L. and is probably not even a subsidiary form of the species. The last point can be settled only by examination of the type or an original specimen, if one is in existence.
- (4) American specimens of *B. ustulatum* L. do not form a separate subspecies. They vary too much. However, they do

tend to have the striae and punctures of the elytra coarser than in European forms; the prothorax more cordiform, (more convex ?), and somewhat less sinuate before the hind angles, with the latter more obtuse; and the antennae and palpi somewhat paler. It would require study of many tens of specimens from different localities to determine the distribution of races (if there are any) of *ustulatum* in North America.

- (5) Subspecies *nactum* Casey was described from a single specimen, so it is not possible to evaluate the difference between it and *tetracolum* Say. According to the description and to my topotype from Long Island, this "subspecies" is specifically the same as *ustulatum* L. It is not really a geographical subspecies, but probably only an aberration (form or morpha). Its distinguishing characteristic had best be considered the coarseness of the striae and punctures of the elytra.

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